

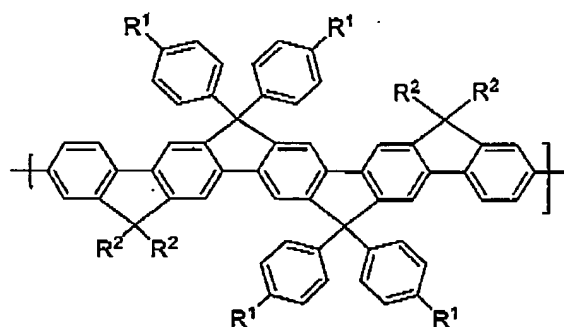
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Amendments to the Claims

1. (Currently Amended) A copolymer comprising at least one monomeric unit having Formula I:



(I)

wherein:

$R^1$  is the same or different at each occurrence and is selected from hydrogen,  $C_1$ - $C_{20}$  alkyl,  $C_2$ - $C_{20}$  alkenyl,  $C_2$ - $C_{20}$  alkynyl,  $C_1$ - $C_{20}$  alkoxy,  $C_1$ - $C_{20}$  oxyalkyl,  $C_2$ - $C_{20}$  oxyalkenyl,  $C_2$ - $C_{20}$  oxyalkynyl,  $C_1$ - $C_{20}$  fluorinated alkyl,  $C_2$ - $C_{20}$  fluorinated alkenyl,  $C_1$ - $C_{20}$  fluorinated oxyalkyl,  $C_2$ - $C_{20}$  fluorinated oxyalkenyl,  $C_2$ - $C_{20}$  fluorinated oxyalkynyl, aryl, heteroalkyl, heteroalkenyl, heteroalkynyl, heteroaryl, -CN, -OR<sup>3</sup>, -CO<sub>2</sub>R<sup>3</sup>, -SR<sup>3</sup>, -N(R<sup>3</sup>)<sub>2</sub>, -P(R<sup>3</sup>)<sub>2</sub>, -SOR<sup>3</sup>, -SO<sub>2</sub>R<sup>3</sup>, and -NO<sub>2</sub>; ~~or adjacent R-groups together can form a 5- or 6-membered cycloalkyl, aryl, or heteroaryl ring.~~

$R^2$  is the same or different at each occurrence and is selected from  $C_1$ - $C_{20}$  alkyl,  $C_2$ - $C_{20}$  alkenyl,  $C_2$ - $C_{20}$  alkynyl,  $C_1$ - $C_{20}$  alkoxy,  $C_1$ - $C_{20}$  oxyalkyl,  $C_2$ - $C_{20}$  oxyalkenyl,  $C_2$ - $C_{20}$  oxyalkynyl,  $C_1$ - $C_{20}$  fluorinated alkyl,  $C_2$ - $C_{20}$  fluorinated alkenyl,  $C_1$ - $C_{20}$  fluorinated oxyalkyl,  $C_2$ - $C_{20}$  fluorinated oxyalkenyl,  $C_2$ - $C_{20}$  fluorinated oxyalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, -CN, -OR<sup>3</sup>, -CO<sub>2</sub>R<sup>3</sup>, -SR<sup>3</sup>, -N(R<sup>3</sup>)<sub>2</sub>, -P(R<sup>3</sup>)<sub>2</sub>, -SOR<sup>3</sup>, -SO<sub>2</sub>R<sup>3</sup>, and -NO<sub>2</sub>; or adjacent  $[[R]]R^2$  groups together can form a 5- or 6-membered cycloalkyl or heterocycloalkyl ring, and

$R^3$  is a substituent on a heteroatom which can be the same or different at each occurrence and is selected from hydrogen, alkyl, aryl, heteroalkyl and heteroaryl;

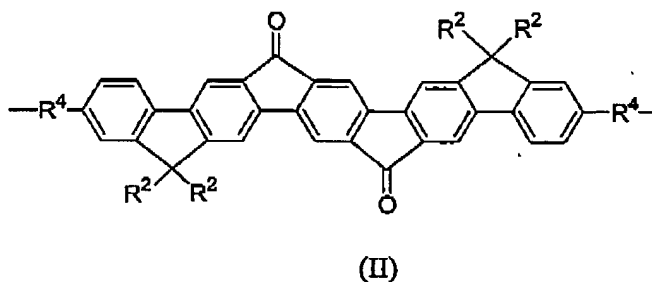
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and at least one second monomeric unit comprising an aromatic group.

2. (Currently Amended) A copolymer according to Claim 1, wherein the second monomeric unit has Formula II:

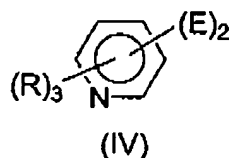
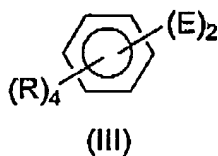


wherein:

$R^2$  is the same or different at each occurrence and is selected from  $C_1$ - $C_{20}$  alkyl,  $C_2$ - $C_{20}$  alkenyl,  $C_2$ - $C_{20}$  alkynyl,  $C_1$ - $C_{20}$  alkoxy,  $C_1$ - $C_{20}$  oxyalkyl,  $C_2$ - $C_{20}$  oxyalkenyl,  $C_2$ - $C_{20}$  oxyalkynyl,  $C_1$ - $C_{20}$  fluorinated alkyl,  $C_2$ - $C_{20}$  fluorinated alkenyl,  $C_1$ - $C_{20}$  fluorinated oxyalkyl,  $C_2$ - $C_{20}$  fluorinated oxyalkenyl,  $C_2$ - $C_{20}$  fluorinated oxyalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, -CN, -OR<sup>3</sup>, -CO<sub>2</sub>R<sup>3</sup>, -SR<sup>3</sup>, -N(R<sup>3</sup>)<sub>2</sub>, -P(R<sup>3</sup>)<sub>2</sub>, -SOR<sup>3</sup>, -SO<sub>2</sub>R<sup>3</sup>, and -NO<sub>2</sub>; or adjacent  $[R]R^2$  groups together can form a 5- or 6-membered cycloalkyl or heterocycloalkyl ring, and

$R^4$  is the same or different at each occurrence and is selected from a single bond, alkylene, arylene, heteroalkylene, and heteroarylene.

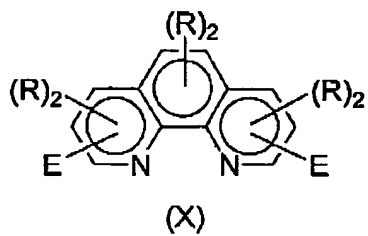
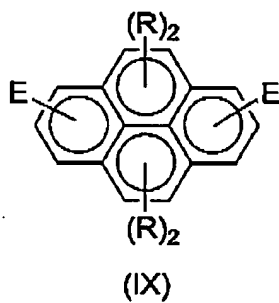
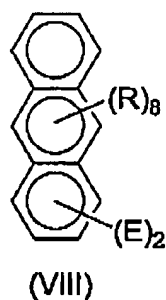
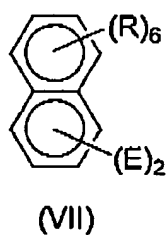
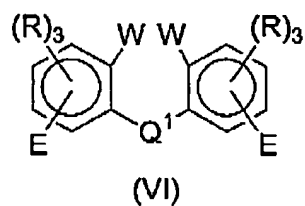
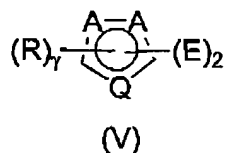
3. (Original) A copolymer according to Claim 1, wherein the second monomeric unit has a formula selected from Formula III through Formula XII and combinations thereof,



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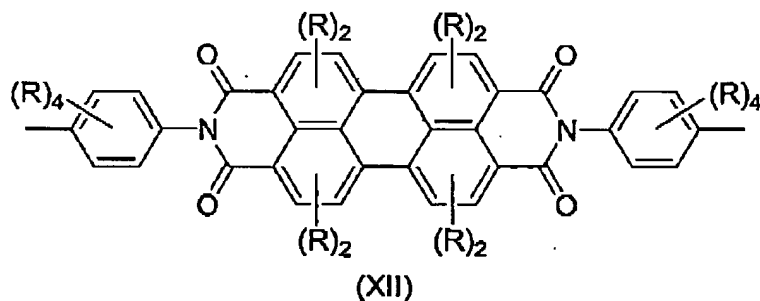
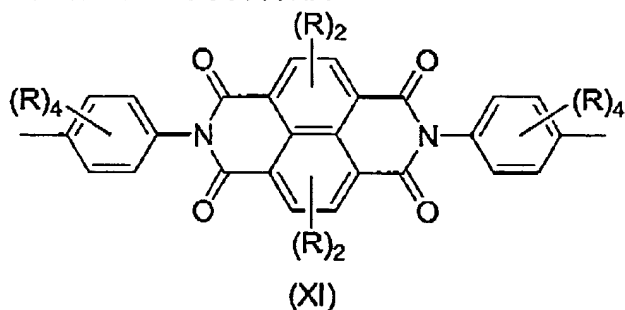
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where:

in each of Formulae III through XII:

R is a substituent on a carbon atom which can be the same or different at each occurrence and is selected from hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>1</sub>-C<sub>20</sub> oxyalkyl, C<sub>2</sub>-C<sub>20</sub> oxyalkenyl, C<sub>2</sub>-C<sub>20</sub> oxyalkynyl, C<sub>1</sub>-C<sub>20</sub> fluorinated alkyl, C<sub>2</sub>-C<sub>20</sub> fluorinated alkenyl, C<sub>1</sub>-C<sub>20</sub> fluorinated oxyalkyl, C<sub>2</sub>-C<sub>20</sub> fluorinated oxyalkenyl, C<sub>2</sub>-C<sub>20</sub> fluorinated oxyalkynyl, aryl, heteroalkyl, heteroalkenyl, heteroalkynyl, heteroaryl, -CN, -OR<sup>3</sup>, -CO<sub>2</sub>R<sup>3</sup>, -SR<sup>3</sup>, -N(R<sup>3</sup>)<sub>2</sub>, -P(R<sup>3</sup>)<sub>2</sub>, -SOR<sup>3</sup>, -SO<sub>2</sub>R<sup>3</sup>, and -NO<sub>2</sub>; or adjacent R groups together can form a 5- or 6-membered cycloalkyl, aryl, or heteroaryl ring;

R<sup>3</sup> is a substituent on a heteroatom which can be the same or different at each occurrence and is selected from hydrogen, alkyl, aryl, heteroalkyl and heteroaryl  
in each of Formulae III, IV, V, VI, VII, VIII, IX and X:

E can be the same or different at each occurrence and is a single bond or a linking group selected from arylene and heteroarylene;

in Formula V:

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A is independently at each occurrence C or N and  $\gamma$  is 0 or an integer selected from 1 or 2, such that when both A are N, then  $\gamma$  is 0; or when one of A is N and one of A is C, then  $\gamma$  is 1; or when both A are C, then  $\gamma$  is 2;

Q is O, S, SO<sub>2</sub>, or NR<sup>3</sup> where:

R<sup>3</sup> is a substituent on a heteroatom which can be the same or different at each occurrence and is selected from hydrogen, alkyl, aryl, heteroalkyl and heteroaryl;

in Formula VI:

Q<sup>1</sup> is a carbonyl group, O, S, SO<sub>2</sub>, or NR<sup>3</sup> where:

R<sup>3</sup> is a substituent on a heteroatom which can be the same or different at each occurrence and is selected from hydrogen, alkyl, aryl, heteroalkyl and heteroaryl;

W is H, alkyl or heteroalkyl; or both of W together can represent one single bond;

in Formula VII:

the two E's are in the 1,4-, 1,5-, 1,8-, 2,3-, or 2,6- positions;

in Formula VIII:

the two E's are in the 1,4-, 1,5-, 1,8-, 2,3-, 2,6-, or 9,10- positions;

in Formula IX:

a first E is in the 1, 2, or 3 position, a second E is in the 6, 7, or 8 position;  
and

in Formula X:

a first E is in the 2, 3, or 4 position; a second E is in the 7, 8, or 9 position.

4. (Original) A copolymer according to Claim 1, wherein R<sup>1</sup> is a C<sub>1</sub>-C<sub>20</sub> alkyl.

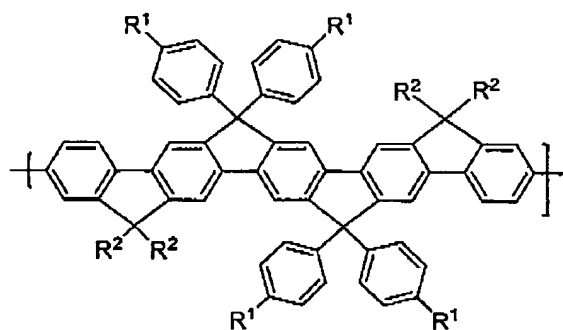
5. (Original) A copolymer according to Claim 1, wherein R<sup>2</sup> is a C<sub>1</sub>-C<sub>20</sub> alkyl.

6. (Currently Amended) An electronic device comprising an active layer positioned between two electrical contact layers, wherein the active layer comprises a copolymer comprising at least one monomeric unit having Formula I:

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(I)

wherein:

$R^1$  is the same or different at each occurrence and is selected from hydrogen,  $C_1$ - $C_{20}$  alkyl,  $C_2$ - $C_{20}$  alkenyl,  $C_2$ - $C_{20}$  alkynyl,  $C_1$ - $C_{20}$  alkoxy,  $C_1$ - $C_{20}$  oxyalkyl,  $C_2$ - $C_{20}$  oxyalkenyl,  $C_2$ - $C_{20}$  oxyalkynyl,  $C_1$ - $C_{20}$  fluorinated alkyl,  $C_2$ - $C_{20}$  fluorinated alkenyl,  $C_1$ - $C_{20}$  fluorinated oxyalkyl,  $C_2$ - $C_{20}$  fluorinated oxyalkenyl,  $C_2$ - $C_{20}$  fluorinated oxyalkynyl, aryl, heteroalkyl, heteroalkenyl, heteroalkynyl, heteroaryl, -CN, -OR<sup>3</sup>, -CO<sub>2</sub>R<sup>3</sup>, -SR<sup>3</sup>, -N(R<sup>3</sup>)<sub>2</sub>, -P(R<sup>3</sup>)<sub>2</sub>, -SOR<sup>3</sup>, -SO<sub>2</sub>R<sup>3</sup>, and -NO<sub>2</sub>; or adjacent R groups together can form a 5- or 6-membered cycloalkyl, aryl, or heteroaryl ring.

$R^2$  is the same or different at each occurrence and is selected from  $C_1$ - $C_{20}$  alkyl,  $C_2$ - $C_{20}$  alkenyl,  $C_2$ - $C_{20}$  alkynyl,  $C_1$ - $C_{20}$  alkoxy,  $C_1$ - $C_{20}$  oxyalkyl,  $C_2$ - $C_{20}$  oxyalkenyl,  $C_2$ - $C_{20}$  oxyalkynyl,  $C_1$ - $C_{20}$  fluorinated alkyl,  $C_2$ - $C_{20}$  fluorinated alkenyl,  $C_1$ - $C_{20}$  fluorinated oxyalkyl,  $C_2$ - $C_{20}$  fluorinated oxyalkenyl,  $C_2$ - $C_{20}$  fluorinated oxyalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, -CN, -OR<sup>3</sup>, -CO<sub>2</sub>R<sup>3</sup>, -SR<sup>3</sup>, -N(R<sup>3</sup>)<sub>2</sub>, -P(R<sup>3</sup>)<sub>2</sub>, -SOR<sup>3</sup>, -SO<sub>2</sub>R<sup>3</sup>, and -NO<sub>2</sub>; or adjacent [[R]]R<sup>2</sup> groups together can form a 5- or 6-membered cycloalkyl or heterocycloalkyl ring, and

$R^3$  is a substituent on a heteroatom which can be the same or different at each occurrence and is selected from hydrogen, alkyl, aryl, heteroalkyl and heteroaryl.

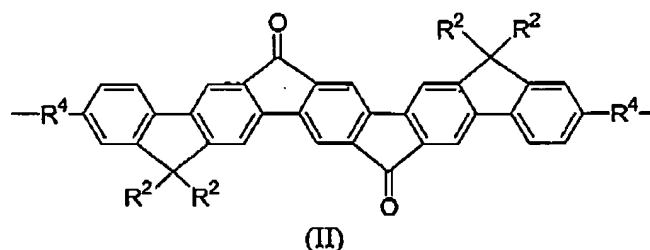
7. (Original) An electronic device according to Claim 6, wherein the copolymer further comprises at least one second monomeric unit comprising an aromatic group.

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8. (Currently Amended) An electronic device according to Claim 7, wherein the second monomeric unit has Formula II:

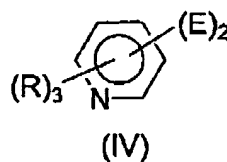
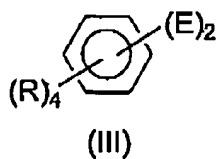


wherein:

$R^2$  is the same or different at each occurrence and is selected from  $C_1$ - $C_{20}$  alkyl,  $C_2$ - $C_{20}$  alkenyl,  $C_2$ - $C_{20}$  alkynyl,  $C_1$ - $C_{20}$  alkoxy,  $C_1$ - $C_{20}$  oxyalkyl,  $C_2$ - $C_{20}$  oxyalkenyl,  $C_2$ - $C_{20}$  oxyalkynyl,  $C_1$ - $C_{20}$  fluorinated alkyl,  $C_2$ - $C_{20}$  fluorinated alkenyl,  $C_1$ - $C_{20}$  fluorinated oxyalkyl,  $C_2$ - $C_{20}$  fluorinated oxyalkenyl,  $C_2$ - $C_{20}$  fluorinated oxyalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, -CN, -OR<sup>3</sup>, -CO<sub>2</sub>R<sup>3</sup>, -SR<sup>3</sup>, -N(R<sup>3</sup>)<sub>2</sub>, -P(R<sup>3</sup>)<sub>2</sub>, -SOR<sup>3</sup>, -SO<sub>2</sub>R<sup>3</sup>, and -NO<sub>2</sub>; or adjacent  $R^2$  groups together can form a 5- or 6-membered cycloalkyl or heterocycloalkyl ring, and

$R^4$  is the same or different at each occurrence and is selected from a single bond, alkylene, arylene, heteroalkylene, and heteroarylene.

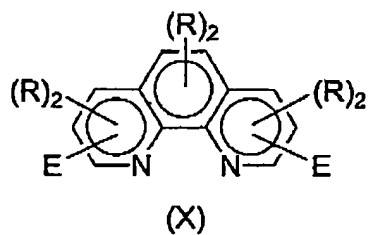
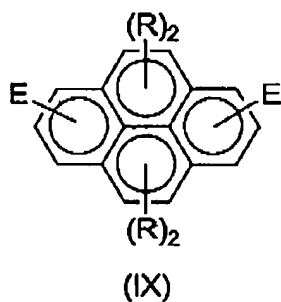
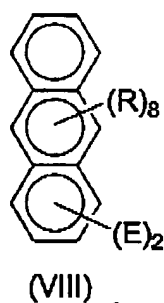
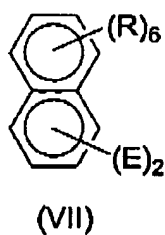
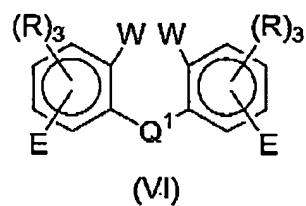
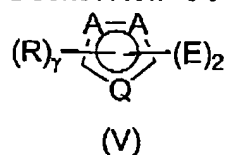
9. (Original) An electronic device according to Claim 7, wherein the second monomeric unit has a formula selected from Formula III through Formula XII and combinations thereof,



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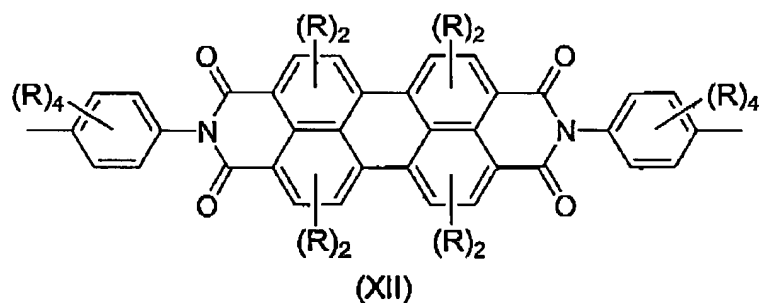
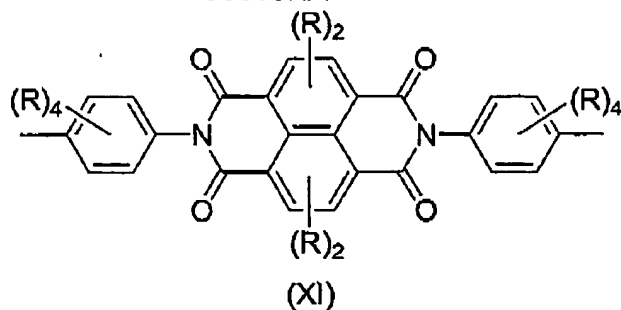




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where:

in each of Formulae III through XII:

R is a substituent on a carbon atom which can be the same or different at each occurrence and is selected from hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>1</sub>-C<sub>20</sub> oxyalkyl, C<sub>2</sub>-C<sub>20</sub> oxyalkenyl, C<sub>2</sub>-C<sub>20</sub> oxyalkynyl, C<sub>1</sub>-C<sub>20</sub> fluorinated alkyl, C<sub>2</sub>-C<sub>20</sub> fluorinated alkenyl, C<sub>1</sub>-C<sub>20</sub> fluorinated oxyalkyl, C<sub>2</sub>-C<sub>20</sub> fluorinated oxyalkenyl, C<sub>2</sub>-C<sub>20</sub> fluorinated oxyalkynyl, aryl, heteroalkyl, heteroalkenyl, heteroalkynyl, heteroaryl, -CN, -OR<sup>3</sup>, -CO<sub>2</sub>R<sup>3</sup>, -SR<sup>3</sup>, -N(R<sup>3</sup>)<sub>2</sub>, -P(R<sup>3</sup>)<sub>2</sub>, -SOR<sup>3</sup>, -SO<sub>2</sub>R<sup>3</sup>, and -NO<sub>2</sub>; or adjacent R groups together can form a 5- or 6-membered cycloalkyl, aryl, or heteroaryl ring;

R<sup>3</sup> is a substituent on a heteroatom which can be the same or different at each occurrence and is selected from hydrogen, alkyl, aryl, heteroalkyl and heteroaryl  
in each of Formulae III, IV, V, VI, VII, VIII, IX and X:

E can be the same or different at each occurrence and is a single bond or a linking group selected from arylene and heteroarylene;

in Formula V:

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A is independently at each occurrence C or N and  $\gamma$  is 0 or an integer selected from 1 or 2, such that when both A are N, then  $\gamma$  is 0; or when one of A is N and one of A is C, then  $\gamma$  is 1; or when both A are C, then  $\gamma$  is 2;

Q is O, S, SO<sub>2</sub>, or NR<sup>3</sup> where:

R<sup>3</sup> is a substituent on a heteroatom which can be the same or different at each occurrence and is selected from hydrogen, alkyl, aryl, heteroalkyl and heteroaryl;  
in Formula VI:

Q<sup>1</sup> is a carbonyl group, O, S, SO<sub>2</sub>, or NR<sup>3</sup> where:

R<sup>3</sup> is a substituent on a heteroatom which can be the same or different at each occurrence and is selected from hydrogen, alkyl, aryl, heteroalkyl and heteroaryl;

W is H, alkyl or heteroalkyl; or both of W together can represent one single bond;

in Formula VII:

the two E's are in the 1,4-, 1,5-, 1,8-, 2,3-, or 2,6- positions;

in Formula VIII:

the two E's are in the 1,4-, 1,5-, 1,8-, 2,3-, 2,6-, or 9,10- positions;

in Formula IX:

a first E is in the 1, 2, or 3 position, a second E is in the 6, 7, or 8 position;

and

in Formula X:

a first E is in the 2, 3, or 4 position; a second E is in the 7, 8, or 9 position.

10. (Original) An electronic device according to Claim 7, wherein the second monomeric unit has a formula

-Y-Z-Y-

wherein:

Y is an aromatic group with at least one substituent selected from alkyl, heteroalkyl, aryl, arylalkyl, heteroaryl, heteroarylalkyl, and NR<sup>5</sup>,

R<sup>5</sup> is H or an alkyl; and

Z is an electron deficient group.

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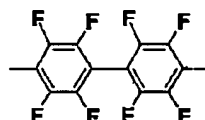
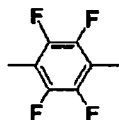
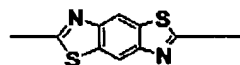
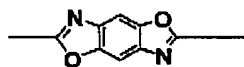
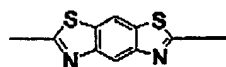
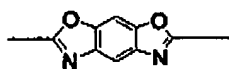
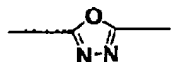
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11. (Original) An electronic device according to Claim 10, wherein Y is selected from fluorenes, spirofluorenes, phenyls, biphenyls, bridged biphenyls, naphthalenes, anthracenes, and combinations thereof.

12. (Canceled)

13. (Original) An electronic device according to Claim 10, wherein Z is selected from:



14. (Original) An electronic device according to Claim 7, wherein the second monomeric unit has hole transport properties.

15. (Original) An electronic device according to Claim 14, wherein the second monomeric unit is selected from carbazoles, triarylamines, aromatic groups having carbazole groups, aromatic groups having triarylamine groups, and combinations thereof.

16. (Canceled)

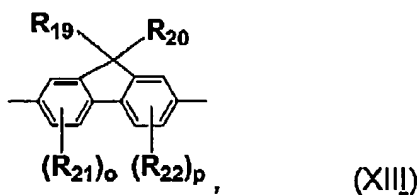
17. (Original) An electronic device according to Claim 7, wherein the second monomeric unit is selected from substituted fluorenes, substituted phenyls, substituted biphenyls, substituted bridged biphenyls, and combinations thereof.

18. (Currently Amended) An electronic device according to Claim 7, wherein the second monomeric unit has Formula XIII:

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wherein

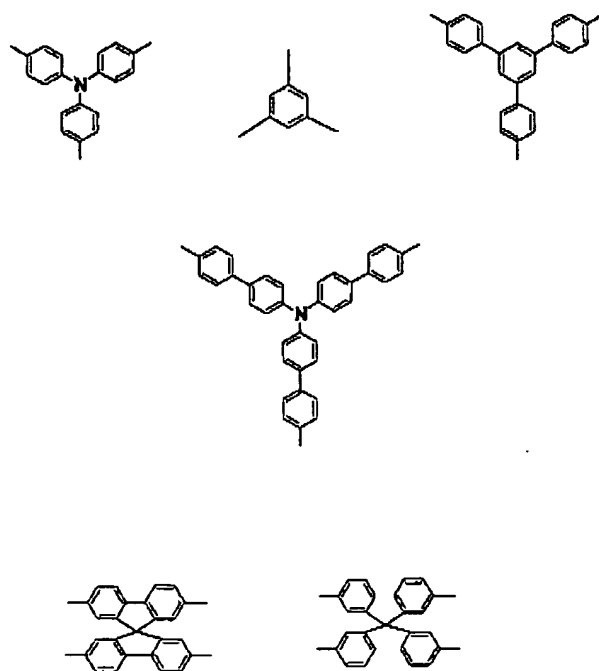
R19-R22 are same or different and are selected from alkyl, heteroalkyl, aryl, arylalkyl, heteroaryl, heteroarylalkyl, and  $\text{NR}^5$ ,

$\text{R}^5$  is H or an alkyl; and

o and p are numbers of substituents on the benzene rings and are same or different and each of o and p is in a range of 0-3.

19. (Original) An electronic device according to Claim 7, wherein the second monomeric unit is a branching monomeric unit having more than two linkage sites.

20. (Currently Amended) An electronic device according to Claim 19, wherein the second monomeric unit is selected from:

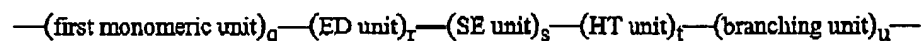


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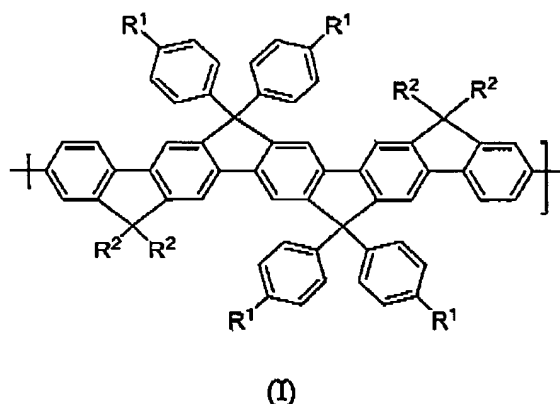
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201. (Currently Amended) An electronic device comprising an active layer positioned between two electrical contact layers, wherein the active layer comprises a copolymer having the formula:



wherein:

the first monomeric unit has Formula I:



wherein:

$R^1$  is the same or different at each occurrence and is selected from hydrogen,  $C_1$ - $C_{20}$  alkyl,  $C_2$ - $C_{20}$  alkenyl,  $C_2$ - $C_{20}$  alkynyl,  $C_1$ - $C_{20}$  alkoxy,  $C_1$ - $C_{20}$  oxyalkyl,  $C_2$ - $C_{20}$  oxyalkenyl,  $C_2$ - $C_{20}$  oxyalkynyl,  $C_1$ - $C_{20}$  fluorinated alkyl,  $C_2$ - $C_{20}$  fluorinated alkenyl,  $C_1$ - $C_{20}$  fluorinated oxyalkyl,  $C_2$ - $C_{20}$  fluorinated oxyalkenyl,  $C_2$ - $C_{20}$  fluorinated oxyalkynyl, aryl, heteroalkyl, heteroalkenyl, heteroalkynyl, heteroaryl, -CN, -OR<sup>3</sup>, -CO<sub>2</sub>R<sup>3</sup>, -SR<sup>3</sup>, -N(R<sup>3</sup>)<sub>2</sub>, -P(R<sup>3</sup>)<sub>2</sub>, -SOR<sup>3</sup>, -SO<sub>2</sub>R<sup>3</sup>, and -NO<sub>2</sub>; ~~or adjacent R groups together can form a 5- or 6 membered cycloalkyl, aryl, or heteroaryl ring;~~

$R^2$  is the same or different at each occurrence and is selected from  $C_1$ - $C_{20}$  alkyl,  $C_2$ - $C_{20}$  alkenyl,  $C_2$ - $C_{20}$  alkynyl,  $C_1$ - $C_{20}$  alkoxy,  $C_1$ - $C_{20}$  oxyalkyl,  $C_2$ - $C_{20}$  oxyalkenyl,  $C_2$ - $C_{20}$  oxyalkynyl,  $C_1$ - $C_{20}$  fluorinated alkyl,  $C_2$ - $C_{20}$  fluorinated alkenyl,  $C_1$ - $C_{20}$  fluorinated oxyalkyl,  $C_2$ - $C_{20}$  fluorinated oxyalkenyl,  $C_2$ - $C_{20}$  fluorinated oxyalkynyl, heteroalkyl, heteroalkenyl, heteroalkynyl, -CN, -OR<sup>3</sup>, -CO<sub>2</sub>R<sup>3</sup>, -SR<sup>3</sup>, -N(R<sup>3</sup>)<sub>2</sub>, -P(R<sup>3</sup>)<sub>2</sub>, -SOR<sup>3</sup>, -

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SO<sub>2</sub>R<sup>3</sup>, and -NO<sub>2</sub>; or adjacent  $[[R]]R^2$  groups together can form a 5- or 6-membered cycloalkyl or heterocycloalkyl ring, and

R<sup>3</sup> is a substituent on a heteroatom which can be the same or different at each occurrence and is selected from hydrogen, alkyl, aryl, heteroalkyl and heteroaryl;

the ED unit has a formula -Y-Z-Y- wherein:

Y is an aromatic group with at least one substituent selected from alkyl, heteroalkyl, aryl, arylalkyl, heteroaryl, heteroarylalkyl, and NR<sup>5</sup>,

R<sup>5</sup> is H or an alkyl; and

Z is an electron deficient group;

the HT unit is a monomeric unit having hole transport properties;

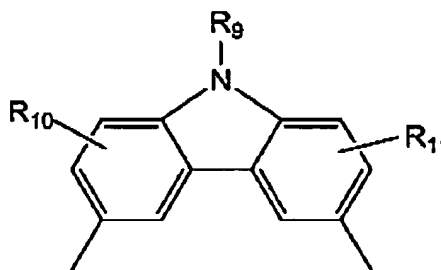
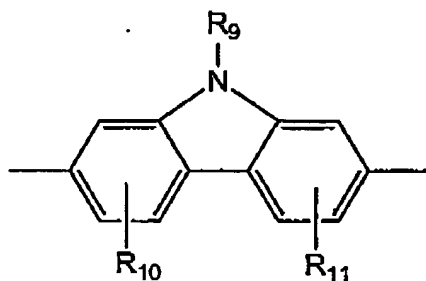
the SE unit is selected from substituted fluorenes, substituted phenyls, substituted biphenyls, substituted bridged biphenyls, and combinations thereof;

the branching unit is a monomeric unit having more than two linkage sites;

q is an integer; and

r, s, t, and u are 0 or an integer, with the proviso that at least one of r, s, t, and u is an integer which is not 0.

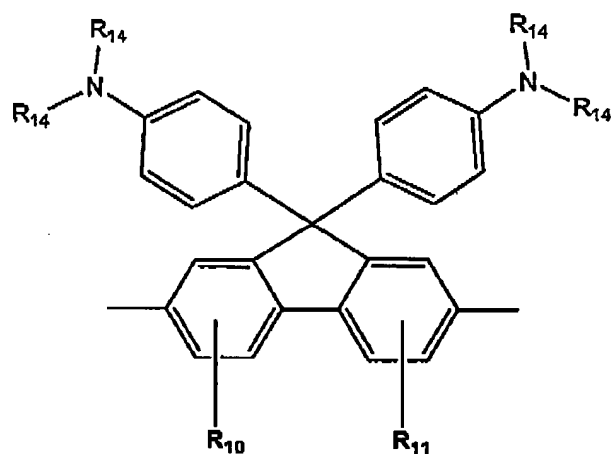
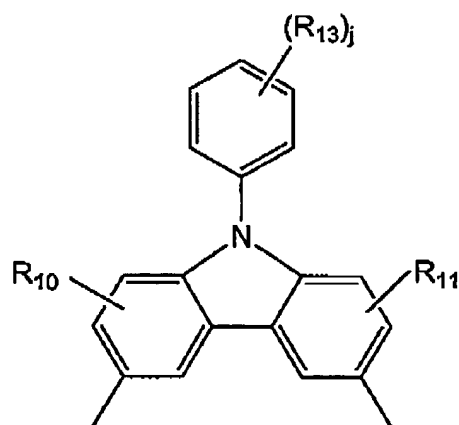
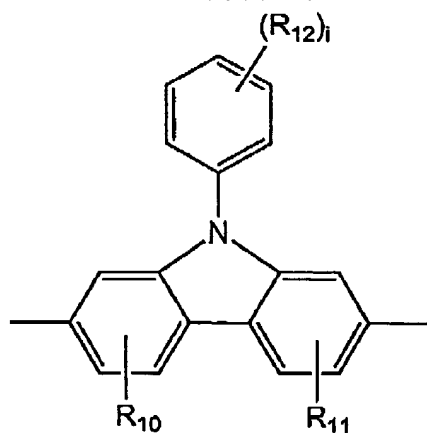
22. (New) An electronic device according to Claim 14, wherein the second monomeric unit is selected from:



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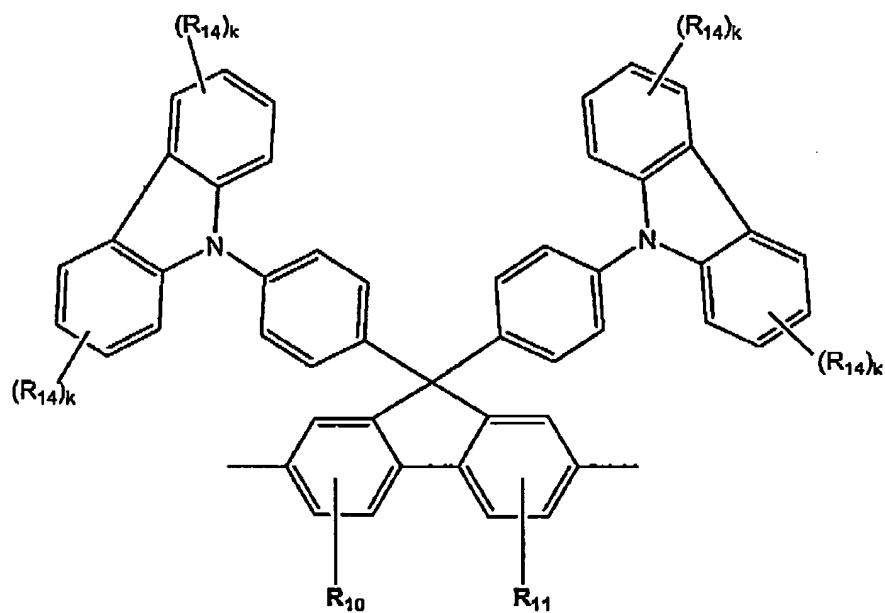
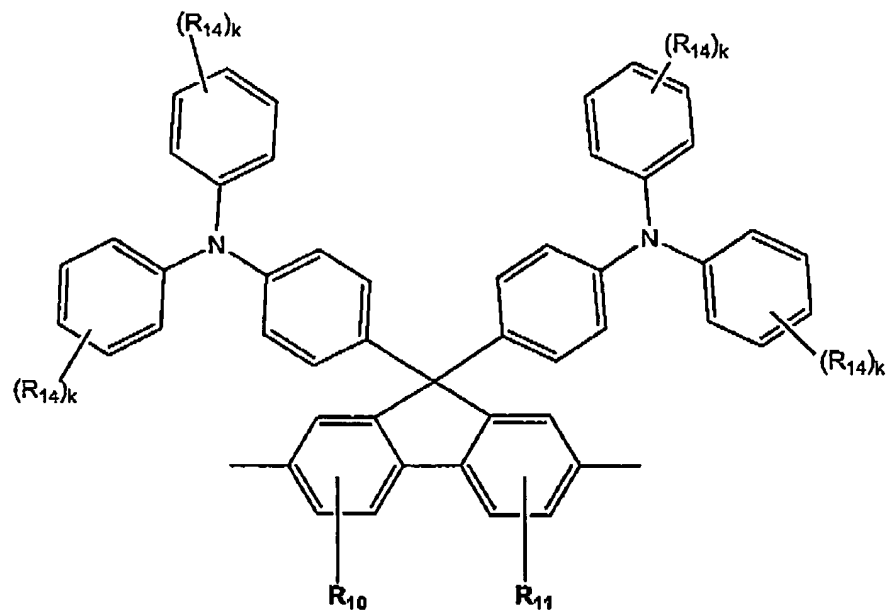
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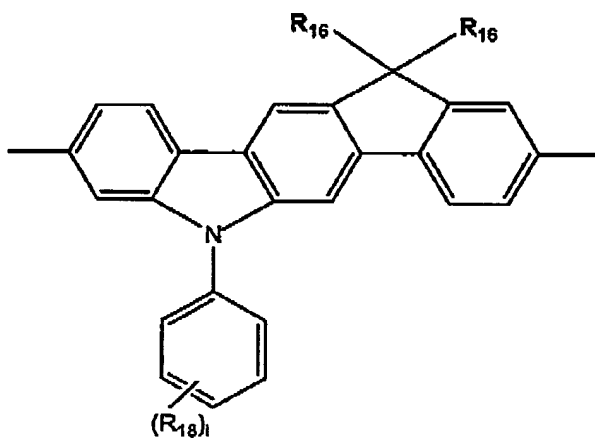
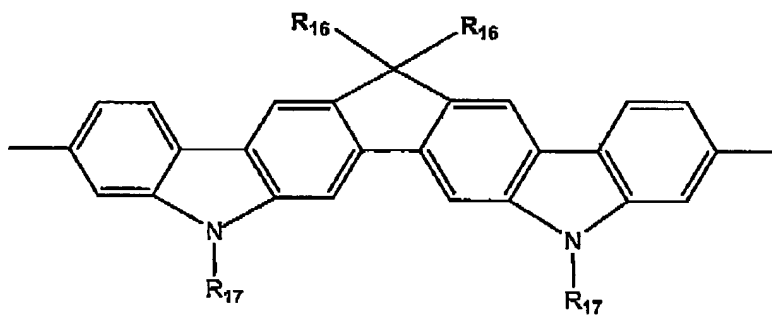
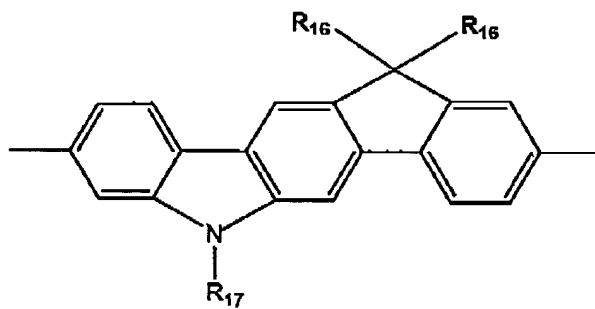




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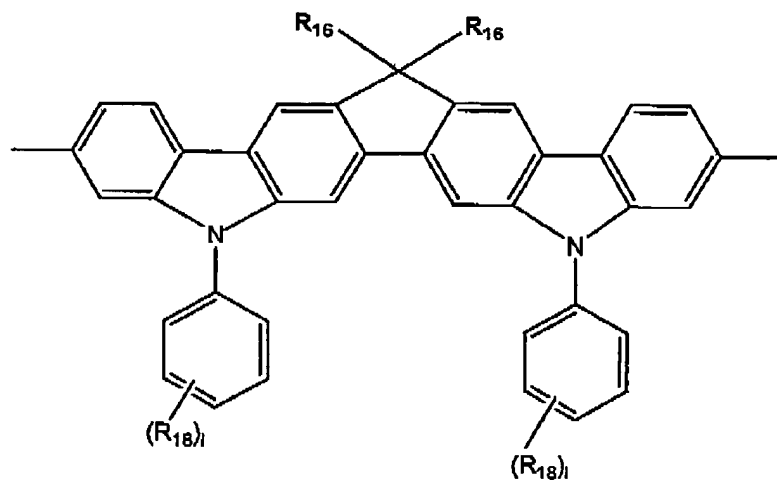
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wherein:

$R_9$ - $R_{18}$  are same or different and are selected from alkyl, heteroalkyl, aryl, arylalkyl, heteroaryl, heteroarylalkyl, and  $NR^5$ ,

$R^5$  is H or an alkyl;

$i, j, k, l$  are numbers of substituents on the benzene rings and are same or different and each of  $i, j, k$ , and  $l$  is in a range of 0-3.